"Problems and Examples in Physics." We believe this collection will be found useful by the student of other text-books of Physical Science. There are 217 examples with answers.

MR. F. GREEN, writing from Cannes, April 16, states that he had just seen, for the first time this year, a flight of about half-a-dozen swallows. They were passing over his garden coming from the sea, and going to the N. W. The nearest land to the S. E. from Cannes is Corsica, 110 miles away. Last year the first flight of swallows which he observed at Cannes was on April 11, and on the same day he heard the nightingale for the first time of the season. This season he has not yet heard the nightingale.

THE additions to the Zoological Society's Gardens during the past week include an Indian Wild Dog (*Canis primævus*), a Common Paradoxure (*Paradoxurus typus*) from the Deccan, presented by Col. A. C. McMaster; a Small Hill Mynah (*Gracula religiosa*) from India, presented by Mrs. A. E. Smithers; a Yellow-faced Amazon (*Chrysotis xanthops*) from S.E. Brazil, presented by Mrs. Geo. B. Crawley; two Common Boas (*Boa constrictor*) from St. Lucia, presented by Mr. G. W. Des Vœux; four Trout (*Salmo fario*), a Golden Tench (*Tinca vulgaris*) from British Fresh Waters, presented by Mr. D. Banks.

ABNORMAL MULTIPLICATION AND ABORTION OF PARTS IN MEDUSÆ[1]

PROF. L. AGASSIZ describes as of very rare occurrence upon the American coast, a peculiar variety of *Sarsia*, presenting six radial tubes, six oulli, and six tentacles. It therefore becomes the more interesting to state that I met with a precisely similar variety on the east coast of Scotland. Moreover, the occurrence of this variety appears to be as rare in the one locality as in the other; for of all the many thousands of *Sarsia* which fell within my observation last summer, I only met with one specimen of the variety in question.

In nearly all the species of naked and covered-eyed Medusæ which I had the opportunity of examining, there was a remarkable absence of monstrous or mis-shapen forms. In the case of one species, however, such forms were of frequent occurrence. This species was *Aurelia aurita*, and the monstrosities showed themselves both as abnormal multiplications and abortions of parts. In all the cases of asymmetrical multiplication which I observed, the peculiarity was confined to the lithocysts, and always showed itself in the same manner. That is to say, I have several times observed, in otherwise normal specimens of *Aurelia aurita*, the presence of nine instead of eight lithocysts, and in all these cases the supernumerary lithocyst—which was always fully formed and provided with the usual hood—was placed beside and in close contact with one of the normal lithocysts. This latter fact appears to me important when considered in relation to the theory of Pangenesis; for upon this theory it would follow that if a supernumerary lithocyst is to be developed at all, we should expect it to be so in apposition with one of the normal lithocysts rather than in any other position. Our ground for expecting this, of course, is that the theory of Pangenesis supposes similar gemmules to have a mutual affinity for one another; and as lithocyst gemmules would naturally be plentiful in the region of any normal lithocysts during the process of its development, or of its repair if injured, if anything went slightly wrong in either of these processes, facilities would be offered for the adhesions of improper gemmules at the point where the disturbing cause acted, and these improper adhesions having once taken place, and being then followed by normal adhesions of proper gemmules, the result would probably be a duplex organ.

I have said that in all the cases of asymmetrical multiplication of parts which fell under my notice, it was the lithocysts alone that were affected. But besides these cases of asymmetrical multiplication of parts in *Aurelia*, I saw several instances of strictly symmetrical multiplication, and in all these instances every part of the organism was equally—or rather proportionally—affected. That is to say, as in the single instance of multiplication of parts which I observed in *Sarsia*, all the organs of the nectocalyx—eye-specks, tentacles, and nutritive tubes—were similarly affected; so in the several instances of multiplication of parts which I observed in *Aurelia*, all the organs of the umbrella were similarly affected. If anyone will turn to the admirable plates contained in Prof. L. Agassiz's third contribution to the Academy of Arts and Sciences, and representing a normal specimen of the genus *Aurelia*, he will see that the nutritive canals bear a very definite and symmetrical arrangement with reference to one another, and also with reference to the ovaries and lithocysts. In particular, there are sixteen principal radial tubes that proceed in straight lines and without branching from the centre to the circumference of the umbrella. Of the sixteen tubes, one passes directly to each of the eight lithocysts, while the remaining eight tubes alternate with these. Thus the sixteen radial tubes together mark out, as it were, the whole umbrella into sixteen equal segments. Well, in all the examples which fell under my notice of abnormal multiplication of parts in *Aurelia* (other than those of mere duplication of lithocysts), the precise and peculiar symmetry just described was strictly adhered to; in all these examples the undue multiplication extended proportionally to ovaries, nutritive tubes, lithocysts, and tentacles; so that its effect was to increase the *number* while adhering to the *type* of the natural segments above described. It is further remarkable that in all the instances I met with, the degree of abnormal multiplication was the same; for in all the instances the ovaries were six, the principal or unbranched radial tubes twenty-four, and the lithocysts twelve. All the parts, and therefore all the natural segments, were thus in all the observed instances increased by one-third of their normal number. It is curious to note that we have here the same proportional increase as has already been described in the case of *Sarsia*. This, of course, may be a mere accident; but whether or not it is so, I think that, as there is certainly no reason either in the case of *Sarsia* or of *Aurelia* to regard the forms in question as distinct species, it becomes worth while to draw attention to the very definite manner in which the abnormal multiplication of parts seems always to occur in these the only genera of Medusæ in which such multiplication has as yet been observed. It is perhaps worth while to add that in all the cases where I noticed this undue multiplication of parts, both in *Sarsia* and in *Aurelia*, the animals were remarkable for the unusual amount of nervous energy which they displayed. There can be no doubt that this fact is to be attributed to the unusually large supply of nervous matter that was secured to the organism by the multiplication of its marginal bodies.

As regards abortion of parts in *Aurelia aurita*, I cannot say that I have ever observed this to occur in any organs other than the ovaries. In these, however, suppression to a greater or less extent is of pretty frequent occurrence. Most usual is the case where one of the four ovaries is of smaller size than the other three. Often the abnormal diminution extends to two alternate or adjacent ovaries, and occasionally to three. More rare is the case of total suppression of one ovary. Only on about a dozen occasions have I seen total suppression of two ovaries, and in these it was sometimes the adjacent, but more frequently the opposite organs that were missing. Lastly, on one occasion I observed, in an otherwise well-grown specimen, a total absence of three out of the four ovigerous pouches. In no case, it may be added, did I observe that a deficiency or absence of ovigerous pouches entailed any corresponding deficiency or absence of any other organs.

I have said that, so far as my experience extends, neither reduction nor complete suppression of parts appears to occur in any organs of *Aurelia aurita*, other than the ovaries. It therefore becomes necessary to add that one or more of the lithocysts with their hoods are frequently to be seen of smaller size than the others. As these variations, however, are usually attended with a deficiency of the general tissue of the umbrella in the neighbourhood of the affected lithocyst, I am inclined to believe that in these cases the small lithocyst is one that has been reproduced to repair the loss of the original organ, which I suppose to have been removed by mechanical violence of some kind—a mutilation which seems well indicated both by the deficiency just alluded to of umbrella tissue in the parts concerned, and also by the cicatrix-like appearance which is presented at the confines of these parts by such tissues as remain. In conclusion, I may state that towards the end of August all the individuals of this species began to undergo a marked diminution in size. Concurrently with this diminution in size, the intensity of the pink colour—which in this species is characteristic of the ovaries, nutritive

[1] Extract from a paper on some new species and varieties of Medusæ, read before the Linnean Society on April 6th, by George J. Romanes, M.A.

system, and tentacles—underwent a marked decrease; so that at last I was only able to obtain specimens one half or one quarter the ordinary size of *Aurelia aurita*, and having nearly all their natural rose-pink colour discharged. I believe that these two phenomena—the loss of colour and the diminution in size—are related to one another in a very intimate manner. Just at the time of year when these two phenomena began to manifest themselves, I observed that all the specimens of *Aurelia* I met with were infested by a species of crustacean, which lodged chiefly in the ovaries and nutritive canals. These crustaceans appeared to devour with avidity all the coloured parts of their hosts, and I think it was probably due to the ever-increasing numbers of these parasites that the size of the individuals composing the incoming generations of *Aurelia* continued to become more and more diminutive. I shall, however, attend to all these points more closely next year, after which I shall doubtless be able to speak with more certainty regarding them.

SCIENTIFIC SERIALS

American Journal of Science and Arts, March.—In this number Mr. Trouvelot directs attention to the phenomenon of what he calls "veiled solar spots." During last year, the chromosphere has been notably thinner than usual, and the granulations smaller and less numerous, rendering more conspicuous the light-grey coloured back-ground between the granules. The veiled spots are seen through the chromosphere that is spread over them like a veil; they are, like ordinary spots, true openings of the photosphere; they are scattered throughout all latitudes, though more complicated in regions where the ordinary spots make their appearance. Mr. Trouvelot has observed spots at least within 10 degrees of the north pole of the sun (very few of the ordinary spots have hitherto been observed beyond 40).—Prof. Kimball describes an ingenious arrangement by which he demonstrates that the law affirming the coefficient of friction on an inclined plane to be constant for all velocities, is not strictly true. The sliding box had a cover 6 feet long, with strips of smoked glass upon it, on which a tuning fork, fixed above to an independent support, traced a wave-line as the box slid down, thus giving a perfect autographic register of the experiment.—A new method of measuring the velocity of electricity is described by Prof. Lovering. He avails himself of Lissajous' method of compounding the rectangular vibrations of two tuning forks, the reflected beam entering a telescope. The forks being maintained in vibration by electro-magnets and brought into unison, the resultant orbit seen in the telescope is invariable. A length of resistance coil is introduced sufficient to change the orbit to some other in the series, and this change reveals the amount of retardation of the one fork's vibrations, due to the inserted resistance.—Prof. Mallet discusses the constitutional formulæ of urea, uric acid, and their derivatives.—A new trilobite, *Dalmanitis dentata* is described by Dr. Barrett, and Prof. Marsh gives (in an appendix) the principal characters of *Tillodontia*, a new order of extinct mammals found in the Eocene deposits of North America.—Mr. Wallace gives an account of some flint implements found in the stratified drift in the vicinity of Richmond, Virginia, and there are one or two notes on points in American geology.

Poggendorff's Annalen der Physik und Chemie, No. 12, 1875.—A few years ago, separate researches were published by Narr and Stefan, on the conduction of heat in gases. M. Winkelmann here extends the inquiry, his object having been to ascertain how far production of currents and radiation affected the velocity of cooling, to study the behaviour of more gases, in order to a fuller comparison with theory, and to determine the dependence of heat-conduction of gases on temperature (the last is reserved for another paper). His apparatus was substantially like Stefan's, and he examined ten gases. The numbers obtained differ considerably from those of Narr, in whose experiments, he thinks, currents had not been avoided, and had contributed not a little to the velocity of cooling. Stefan's value for air is 6 per cent. greater than the author's, and this difference is explained by radiation, which Stefan had not taken into account.—M. Weber studies the coloured products obtained through the action of sulphur and selenium on sulphuric acid anhydride. He has got from this action a new oxygen compound of sulphur and a corresponding substitution product of selenium. The former contains twice as much sulphur as sulphuric acid (57·14 per cent.), and the formula assigned is S_2O_3. M. Weber proposes for it the name of *sesquioxide of sulphur*, or *dithionoxide*. In the dry state it forms bluish-green crystals, and is like malachite in structure. Liquid only in the moment of production, it soon solidifies and cannot be fused again without decomposition. In a cool chamber, decomposition occurs but slowly. The selenium compound is denoted by the formula $Se\,SO_3$ (it requires 49·68 per cent. selenium, 20·12 per cent. sulphur.) The crystallised solid is of a dirty green colour, and it is much more stable than *dithionoxide*.—Before his death, Prof. J. J. Müller was engaged in experimenting on the influence of insulators on induction; and he communicated to Dr. Fiedler the following results. (1) Insulating media exercise, on the strength of induction, the opposite influence to the induced magnetism of the conductors. (2) Static electricity accumulated on insulators, exerts an influence on the strength of induction. Dr. Kleiner here gives details of the experiments, from which these conclusions were formed.—In a paper on thermo-electricity, M. Kohlrausch considers that for a theory of the phenomena, we do not need an immediate action of the contact surfaces, but can arrive at full agreement with the facts by assuming electromotive forces in the interior of the conductors, the places of contact having only a secondary influence. In every thermopile, when in action, there necessarily is, with the difference of temperature, a streaming over of heat from the hotter to the colder junction. The difference of temperature of the soldered parts has hitherto been thought the cause of the electromotive force; but with equal right we may take as basis the other inseparable circumstance, and suppose that with a heat current in a determinate mass, dependent on the nature of the conductor, an electric current is connected (provided that other electromotive forces are first excluded). These ideas are developed in the paper.—M. Holtz communicates the results of various attempts to improve the simple "influence" machines; and Prof. Lommel furnishes an elementary treatment of some optical problems, the smallest deflection in the prism, the achromatic prism, and the elementary theory of the rainbow.—M. Edlund deals with two objections to his unitarian theory of electricity; one by Prof. Newman, that to explain unipolar induction, the presence of at least two electric fluids is necessary; the other by M. Baumgartner, that the unitarian theory seems to contradict the supposition that vacant space has no conductivity for the galvanic current.—M. Sadebeck contributes some mineralogical studies from Kiel University; and among other subjects treated in this number are, the behaviour of electricity in electrolytes (Budde) and the alteration of the velocity of light in quartz through pressure (Mach and Merten).

Memorie Della Societa degli Spettroscopisti Italiani, Sept. 1875.—Prof. Tacchini continues his detailed remarks on sun-spots and faculæ observed by him at Palermo in 1873. The spectral lines of the prominences in the neighbourhood of faculæ are also fully given, the lines which appear to have been seen in nearly every eruption are D, b^1 b^2 b^3 b^4, 4,943, 5,031, and 5,316; the other lines less frequently seen are 5,263, 5,272, 5,282, 5,226, 5,232, 5,234, and 5,195.

Oct. 1875.—Prof. Tacchini gives a note on his observations in the previous number, and remarks the greater number of eruptions of magnesium on the western limb than on the eastern; the numbers on the former being more than double those on the eastern. The actual numbers for each month in 1873 are given. The number of eruptions in the northern and southern hemispheres are equal to each other. The zones of maximum eruptions appear to be between N. lat. 10° and 20°, and S. lat 0° and 10°.—Communications from Father Secchi, Prof. Dorna, and Prof. Tacchini on the partial solar eclipse of Sept. 29, 1875. It is remarkable that the first contact was observed by the spectroscopic method some seconds later than by the simple telescopes, and the last contact several seconds earlier.—Drawings of the solar prominences during the months of May and June 1874 by Secchi and Tacchini accompany this number.

Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie, Dec. 1, 1875.—The concluding part of Herr Wild's paper on the late congresses appears in this number. Against what has been said of these gatherings, that their sole result would be the accumulation of millions of useless observations upon the millions that have already been published, he contends that in his opinion observations are useless only when they are faulty and inaccessible; and that he has found himself hampered, not by their great quantity, but by their deficiencies, inconvenience of form, or variety of arrangement. It is true that out of millions of figures perhaps only some thousands prove of value to the investigator; but who can decide which will and which will not eventually be used? Registers intended for publication are submitted to a more careful revision than those preserved only